IN THE CLAIMS

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (Original) Method of coding information symbols according to a code defined on a Galois field F_q, where q is an integer greater than 2 and equal to a power of a prime number, and of length $n = p(q-1)$, where p is an integer greater than 1, characterized in that it comprises the following steps:

a) a p-tuple of integers $(t_1,...,t_p)$ is chosen such that

$q-1 > t_1 > t_2 > ... > tp > 0$,

and a p-tuple of diagonal square matrices $(Y_1,...,Y_p)$ of dimension $(q-1)$ on F_q such that, for any i $(1 \leq i \leq q-1)$, the p elements in position (i,i) of these matrices $Y_1,...,Y_p$ are different in pairs,

b) said information symbols are placed successively in p words $\underline{a}_l$ of length $(q-1- t_l)$ (where $l = 1, ... ,p$),

c) words $\underline{u}_l$ (where $l = 1, ... ,p$) are formed of length $(q-1)$, which constitute the components of the "precoded word" $\underline{u} = [\underline{u}_1\ \underline{u}_2\ ...\ \underline{u}_p]$, by supplementing the corresponding word $\underline{a}_l$ by means of redundant symbols so that $\underline{u}_l$ is orthogonal to the matrix $H^{(l)}$, where the matrices $H^{(l)}$ are defined by $H^{(l)}_{ij} = \gamma^{i(j-1)}$ $(1 \leq i \leq t, 1 \leq j \leq q-1)$, where γ is a symbol chosen from amongst the primitive elements of Fq, and

d) a code word

$$\underline{v} = [\underline{v}_1\ \underline{v}_2 \cdots \underline{v}_p]$$

is formed, where each word $\underline{v}_l$ ($l = 1,\ldots,p$) is of length (q-1), by resolving the system of equations

$$\begin{cases} \underline{v}_l & + & \underline{v}_2 & + & \ldots & + & \underline{v}_p & = & \underline{u}_l\,, \\ \underline{v}_1 Y_1 & + & \underline{v}_2 Y_2 & + & \ldots & + & \underline{v}_p Y_p & = & \underline{u}_2\,, \\ \underline{v}_1 Y^2{}_1 & + & \underline{v}_2 Y^2{}_2 & + & \ldots & + & \underline{v}_p Y^2{}_p & = & \underline{u}_3\,, \\ & & & & \ldots & & & & \\ \underline{v}_1 Y_1^{p-1} & + & \underline{v}_2 Y_2^{p-1} & + & \ldots & + & \underline{v}_p Y_p^{p-1} & = & \underline{u}_p\,. \end{cases}$$

(It is noted that the underlining is in the original, and is meant to appear in the claim.)

2. (Original) Coding method according to Claim 1, characterized in that an algebraic equation in X and Y is considered such that, for any value γ^{i-1} ($i = 1,\ldots,q$-1) taken by X, said algebraic equation has p distinct solutions denoted y_l (γ^{i-1}) (where $l = 1,\ldots,p$); and in that the diagonal element in position (i,i) of each of said matrices Y_l is taken to be equal to $y_l(\gamma^{i-1})$.

3. (Original) Coding method according to Claim 1 or Claim 2, characterized in that each word a_l (where $l = 1,\ldots,p$) represents a respective approximation of resolution of an image coded at source.

4. (Original) Method of decoding received data resulting from the transmission of coded symbols according to Claim 1, characterized in that it comprises the following steps:

e) from the word received

$$\underline{r}=\left[\underline{r}_1\,\underline{r}_2\cdots\underline{r}_p\right],$$

where each word $\underline{r}_l$ (l = 1,...,p) is of length (q-1), at least one of the components $\underline{s}_l$ (where l = 1,...,p) of length (q-1), of the "post-received word" $\underline{s}$ = [$\underline{s}_1$ $\underline{s}_2$ ... $\underline{s}_p$], is calculated, according to:

$$\begin{cases} \underline{s}_1 = \underline{r}_1 + \underline{r}_2 + \ldots + \underline{r}_p, \\ \underline{s}_2 = \underline{r}_1 Y_1 + \underline{r}_2 Y_2 + \ldots + \underline{r}_p Y_p, \\ \underline{s}_3 = \underline{r}_1 Y^2{}_1 + \underline{r}_2 Y^2{}_2 + \ldots + \underline{r}_p Y^2{}_p, \\ \qquad\qquad\ldots \\ \underline{s}_p = \underline{r}_1 Y_1^{p-1} + \underline{r}_2 Y_2^{p-1} + \ldots + \underline{r}_p Y_p^{p-1}, \end{cases}$$

and

f) at least one of the components $\underline{\hat{u}}_l$ [(where l = 1,...,p) of length (q-1), of the "post-associated word" $\underline{\hat{u}}$ = [$\underline{\hat{u}}_l$ $\underline{\hat{u}}_2$ ...$\underline{\hat{u}}_p$], is calculated, correcting the word $\underline{s}_l$ with the same l according to the error syndrome vector $H^{(l)} \cdot s_l^T$. (It is noted that the underlining is in the original, and is meant to appear in the claim.)

5. (Original) Method of decoding received data resulting from the transmission of coded symbols according to Claim 2, characterized in that it comprises the following steps:

e') a maximal error correction algorithm is applied to each received word $\underline{r}$, so as to obtain an estimation

$$\hat{v}=\left[\underline{\hat{v}}_1\,\underline{\hat{v}}_2\cdots\underline{\hat{v}_p}\right],$$

where each word $\underline{\hat{v}}_l$ ($l = 1, \ldots, p$) is of length (q-1), of the corresponding transmitted word $\underline{v}$, and

f) at least one of the components $\underline{\hat{u}}$ (where $l = 1,\ldots,p$), of length (q-1), of the "post-associated word" $\underline{\hat{u}} = [\underline{\hat{u}}_1\ \underline{\hat{u}}_2 \ldots \underline{\hat{u}}_p]$, is calculated, according to:

$$\begin{cases} \underline{\hat{u}}_1 = \underline{\hat{v}}_1 + \underline{\hat{v}}_2 + \ldots + \underline{\hat{v}}_p, \\ \underline{\hat{u}}_2 = \underline{\hat{v}}_1 Y_1 + \underline{\hat{v}}_2 Y_2 + \ldots + \underline{\hat{v}}_p Y_p, \\ \underline{\hat{u}}_3 = \underline{\hat{v}}_1 Y^2{}_1 + \underline{\hat{v}}_2 Y^2{}_2 + \ldots + \underline{\hat{v}}_2 Y^2{}_p \\ \qquad \ldots \\ \underline{\hat{u}}_p = \underline{\hat{v}}_1 Y_1^{p-1} + \underline{\hat{v}}_2 Y_2^{p-1} + \ldots + \underline{\hat{v}}_p Y_p^{p-1}. \end{cases}$$

(It is noted that the underlining is in the original, and is meant to appear in the claim.)

6.-10. (Canceled)

11. (Original) Device (102) for coding information symbols according to a code defined on a Galois field $\mathbf{F}q$, where q is an integer greater than 2 and equal to a power of a prime number, and of length $n = p(q$-1), where p is an integer greater than 1, characterized in that, a p-tuple of integers $(t_1,\ldots,t_p)$ such that

$$q-1 > t_1 > t_2 > \ldots > t_p > 0,$$

and a p-tuple of diagonal square matrices $(Y_1,\ldots,Y_p)$ of dimension (q-1) on $\mathbf{F}_q$ such that, for any i ($1 \leq i\ q$-1), the p elements in position (i,i) of these matrices $Y_1,\ldots,Y_p$ are different in pairs, having been chosen, it is able to:

- place said information symbols successively in p words $\underline{a}_l$ of length (q-1- t_l) (where $l = 1,\ldots,p$),

- form words $\underline{u}_l$ (where $l = 1,\ldots,p$) of length $(q-1)$, which constitute the components of the "precoded word" $\underline{u} = [\underline{u}_1\ \underline{u}_2\ \ldots\ \underline{u}_p]$, supplementing the corresponding word $\underline{a}_l$ by means of redundant symbols so that $\underline{u}_l$ is orthogonal to the matrix $H^{(t_l)}$, where the matrices $H^{(t)}$ are defined by $H^{(t)}_{ij} = \gamma^{i(j-1)}$ $(1 \leq i \leq t,\ 1 \leq j \leq q-1)$, where γ is a symbol chosen from amongst the primitive elements of $\mathbf{F}q$, and

- form a code word

$$\underline{v} = [\underline{v}_1\ \underline{v}_2 \cdots \underline{v}_p],$$

where each word v_l $(l = 1, \ldots, p)$ is of length $(q-1)$, by resolving the system of equations

$$\begin{cases} \underline{v}_l & + & \underline{v}_2 & + & \cdots & + & \underline{v}_p & = & \underline{u}_l\,, \\ \underline{v}_1 Y_1 & + & \underline{v}_2 Y_2 & + & \cdots & + & \underline{v}_p Y_p & = & \underline{u}_2\,, \\ \underline{v}_1 Y^2{}_1 & + & \underline{v}_2 Y^2{}_2 & + & \cdots & + & \underline{v}_p Y^2{}_p & = & \underline{u}_3\,, \\ \underline{v}_1 Y_1^{p-1} & + & \underline{v}_2 Y_2^{p-1} & + & \cdots & + & \underline{v}_p Y_p^{p-1} & = & \underline{u}_p\,. \end{cases}$$

(It is noted that the underlining is in the original, and is meant to appear in the claim.)

12. (Original) Coding device according to Claim 11, characterized in that it is also able to assign the value $y_l\,(\gamma^{i-1})$ to the diagonal element in position (i,i) of each of said matrices Y_l, where, for a predetermined algebraic equation in X and Y, said algebraic equation has p distinct solutions denoted $y_l\,(\gamma^{i-1})$ (where $l = 1,\ldots,p$) for any value γ^{i-1} ($i = 1,\ldots,q-1$) taken by X.

13. (Original) Device (10) for decoding received words $\underline{r}$ resulting from the transmission of coded words $\underline{v}$ according to the invention, characterized in that it comprises:

- an error correction unit (107) able to apply an error correction algorithm to each word received $\underline{r}$, so as to supply at least one component $\underline{\hat{u}}_l$ (where l = 1,...,p) of a "post-associated word" $\underline{\hat{u}}$, and

- a redundancy elimination unit (108) able to remove from said component $\underline{\hat{u}}_l$ the symbols situated at the positions identical to the positions of the component $\underline{u}_l$ with the same l of the corresponding precoded word $\underline{u}$, in which redundant symbols were placed at the time of coding. (It is noted that the underlining is in the original, and is meant to appear in the claim.)

14. (Canceled)

15. (Original) Information data transmission apparatus (48), characterized in that it comprises a coding device according to Claim 11 or Claim 12, as well as a modulator (103) for modulating the data resulting from the coding of said information data.

16. (Currently Amended) Data reception apparatus (70), characterized in that it comprises a demodulator (106) for demodulating the received data, as well as a coding device according to Claim 13 ~~or Claim 14~~.

17. (Original) Information data transmission apparatus (48), characterized in that it comprises a coding device according to Claim 11 or Claim 12, an interleaver (20) able to permute the symbols of each code word $\underline{v} = (v^0, v^1, \ldots, v^{n-1})$ so as to form a word to be transmitted

$$\underline{v}^* = \left(v^0, v^{q-1}, v^{2(q-1)}, \ldots, v^{(p-1)(q-1)}, v^1, v^q, v^{2q-1}, \ldots, v^{(p-1)(q-1)+1}, \ldots, v^{n-1}\right),$$

and a modulator (103) for modulating the symbols of said word to be transmitted $\underline{v}^*$.

(It is noted that the underlining is in the original, and is meant to appear in the claim.)

18. (Currently Amended) Data reception apparatus (70), characterized in that it comprises a demodulator (106) for demodulating the received data so as to form interleaved received words

$$\underline{r}^* = \left(r^0, r^{q-1}, r^{2(q-1)}, \ldots, r^{(p-1)(q-1)}, r^1, r^q, r^{2q-1}, \ldots, r^{(p-1)(q-1)+1}, \ldots, r^{n-1}\right),$$

where q is an integer greater than 2 and equal to a power of a prime number, p an integer greater than 1, and $n = p(q\text{-}1)$, a deinterleaver (30) for permuting the symbols of each interleaved received word $\underline{r}^*$ so as to form a received word $\underline{r} = (r^0, r^1, \ldots, r^{n-1})$, and a decoding device according to Claim 13 ~~or Claim 14~~.

19.-21. (Canceled)

22. (Original) Method of decoding received symbols, characterized in that it comprises the steps of:

determining a current state of transmission;

selecting one of a plurality of available decoding algorithms in accordance with the current state of the transmission determined in said determining step; and

decoding the received symbols by using the selected decoding algorithm.

23. (Original) Decoding method according to Claim 22, wherein it is determined whether or not a mean transmission error rate exceeds a predetermined threshold in said determined step, and in said selecting step, a first decoding algorithm is selected if the mean transmission error rate is determined to exceed the predetermined threshold and a second decoding algorithm is selected if the mean transmission error rate is determined not to exceed the predetermined threshold.

24. (Original) Decoding method according to Claim 23, wherein the second decoding algorithm is lower in performance but faster in processing than the first decoding algorithm.

25. (Original) Decoding method according to Claim 23, wherein the first decoding algorithm is the Feng-Rao algorithm.

26. (Original) Decoding method according to Claim 23, wherein the second decoding algorithm is an algorithm based on the Reed-Solomon code.

27. (Original) Device for decoding received symbols, characterized in that it comprises:

determination means for determining a current state of transmission;

selection means for selecting one of a plurality of available decoding algorithms in accordance with the current state of the transmission determined in said determining step; and

decoding means for decoding the received symbols by using the selected decoding algorithm.

28. (Original) Computer program, characterized in that it comprises computer program code instructions for executing the steps of a decoding method according to Claim 22.